GB 2292723A

(12) UK Patent Application (19) GB (11) 2 292 723 (13) A

(43) Date of A Publication 06.03.1996

(21) Application No 9417533.8

(22) Date of Filing 01.09.1994

(71) Applicant(s)
Trewhella Bros. (UK) Limited

(Incorporated in the United Kingdom)

Bowyer Street, BIRMINGHAM, B10 0SA, United Kingdom

(72) Inventor(s)
Peter William Leacroft Saywell

(74) Agent and/or Address for Service
Derek Jackson Associates
The Haven, Plough Road, Tibberton, DROITWICH, Worcs, WR9 7NQ, United Kingdom

(51) INT CL^6
B66D 1/74

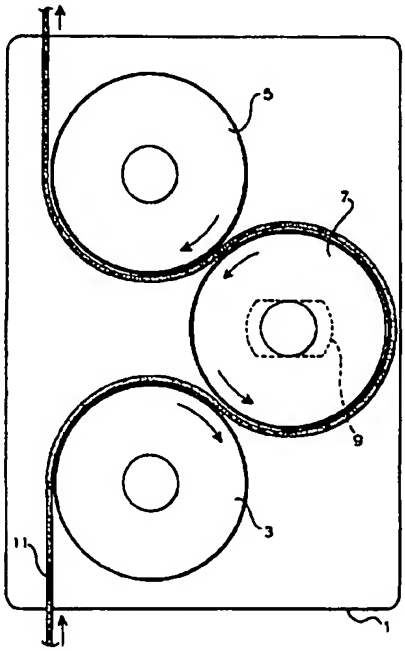
(52) UK CL (Edition O)
B8B BCFA

(56) Documents Cited
GB 2171973 A GB 1445032 A GB 0874912 A
EP 0110250 A2 US 4557465 A

(58) Field of Search
UK CL (Edition N) B8B BCDL BCDM BCFA
INT CL^6 B66D
DATABASE:WPI

(54) MULTI-ROLL CAPSTAN

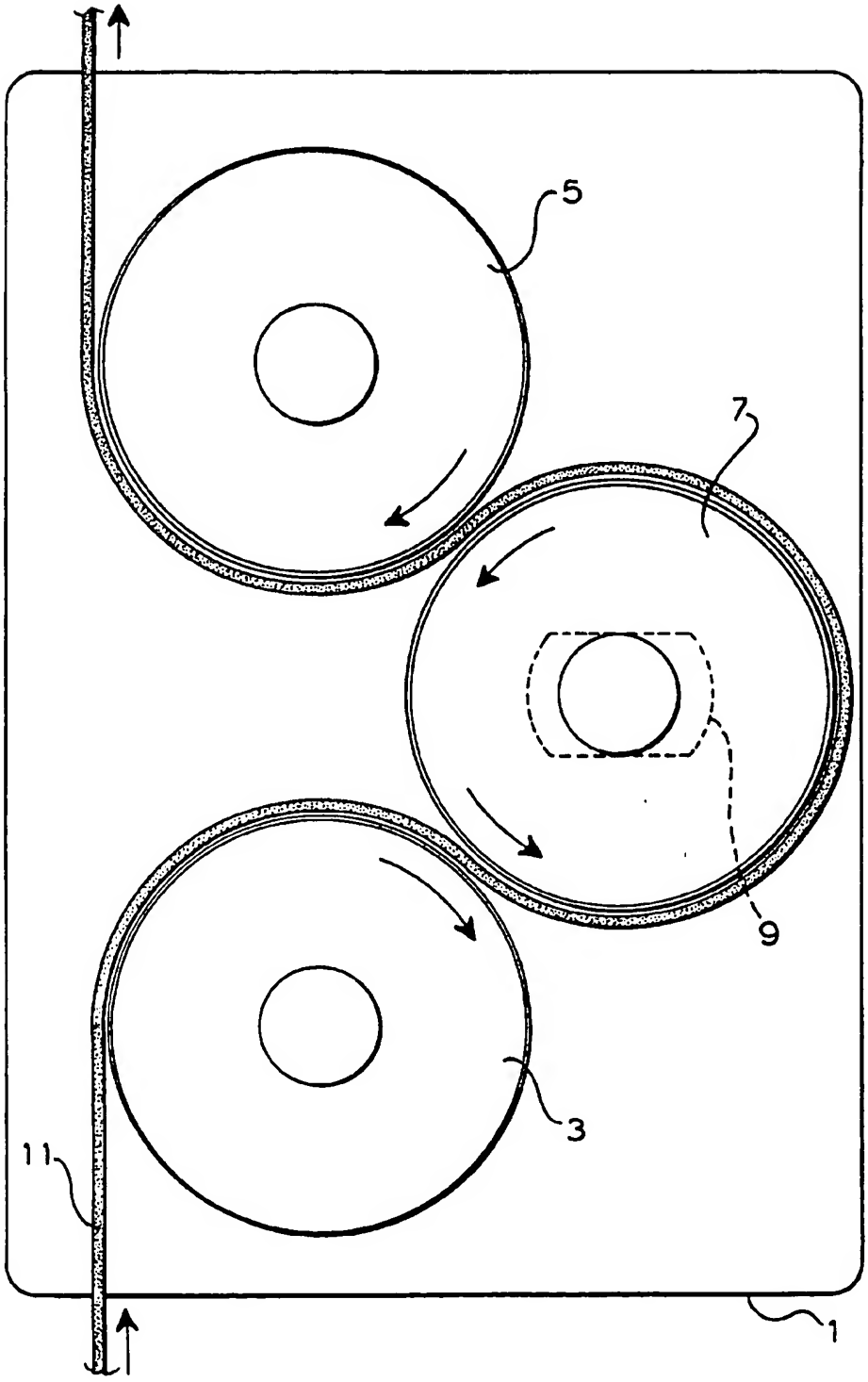
(57) A winch mechanism includes first, second and third rolls 3, 5, 7 for receiving therearound webbing, cable, rope or the like 11. The first and second rolls 3 and 5 are rotatable about the fixed axes thereof and the third roll 7 is rotatable about the axis thereof which is also moveable towards and away from a line joining the axes of the first and second rolls at a point along the line intermediate the first and second rolls. The webbing, cable, rope or the like extends around the side of the first roll 3 remote from the third roll 7, then passes between the first roll and the third roll, then extends around that part of the third roll 7 remote from the line joining the axes of the first and second rolls 3 and 5, then passes between the second roll 5 and the third roll 7, and finally extends around the side of the second roll remote from the third roll. The distance between the first and second rolls 3 and 5 is less than the diameter of the third roll 7 with the webbing, cable, rope or the like 11 extending therearound.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

GB 2 292 723 A


5
7
9
3
11
1

2292723

WINCH MECHANISM

The present invention is concerned with a winch mechanism for gripping and moving a webbing material or a cable, rope or like material.

Traditional drum winches for wire ropes incorporate a drum onto which the wire rope is wound, the axial length of the drum being considerably greater than the diameter of the wire rope. As the wire rope is wound onto the drum, the wire accumulates on the drum as a number of side-by-side turns which eventually build up into a number of layers. However, as the number of layers builds up the mechanical advantage of the winch decreases.

It is also known to employ webbing material in winches in place of the conventional cable or rope. Webbing material has the advantages that it is extremely strong and lightweight, but with webbing it is essential that each turn is wound on top of the preceding turn. Thus the effective diameter of the winch increases with each turn and the mechanical advantage rapidly decreases. Nevertheless, given the advantages of webbing material there is a demand for a winch which can be used with webbing material but which does not suffer the problem of a rapidly decreasing mechanical advantage.

It is therefore an object of the present invention to provide a winch mechanism for gripping and moving inter alia a webbing material.

According to the present invention there is provided a winch mechanism comprising first, second and third rolls for receiving therearound a webbing, cable, rope or the like, the first and second rolls being rotatable about the axes thereof and the third roll being rotatable about the axis thereof and being moveable towards and away from a line joining the axes of the first and second rolls at a point along the line intermediate the first and second rolls,

the arrangement of the webbing, cable, rope or the like being such that it:

(a) extends around that part of the periphery of the first roll on that side thereof remote from the third roll;

(b) passes between the first roll and the third roll;

(c) extends around that part of the periphery of the third roll remote from the line joining the axes of the first and second rolls;

(d) passes between the second roll and the third roll; and

(e) extends around that part of the periphery of the second roll on that side thereof remote from the third roll,

the first, second and third rolls and the webbing, cable, rope or the like being dimensioned such that the distance between the first and second rolls is less than the diameter of the third roll with the webbing, cable, rope or the like extending therearound.

The first, second and third rolls may be mounted between a pair of side plates. The third roll may be slidably mounted in the side plates, for example by means of slots or recesses formed therein.

The third roll may be moveable in a direction substantially perpendicular to the line joining the axes of the first and second rolls.

The third roll may be moveable along a line which intersects the line joining the axes of the first and second rolls at a point substantially midway between the axes of the first and second rolls.

The webbing, cable, rope or the like may comprise a webbing material.

One or more of the first, second and third rolls may be provided with a relatively high friction material around the periphery thereof.

The first, second and third rolls may be dimensioned such that the distance between the first and second rolls is less than the diameter of the third roll.

One of the first and second rolls may be provided with drive means. The drive means may be powered, for example mechanically, hydraulically or electrically, or may be operable manually. The driven roll and the third roll may be interconnected by means of gears such that rotation of the driven roll causes corresponding counter-rotation of the third roll.

The webbing, cable, rope or the like wound in by the winch mechanism may be stored in storage means, such as on a rotatable drum.

The winch mechanism may include a braking mechanism for preventing uncontrolled unwinding of the webbing, cable, rope or the like.

For a better understanding of the present invention and to show more clearly how it may be carried into effect reference will now be made, by way of example, to the accompanying figure which illustrates one embodiment of the a drumless winch mechanism according to the present invention.

The drumless winch mechanism shown in the figure comprises a pair of side plates 1, only one of which is shown for clarity, having mounted rotatably therebetween three rolls 3, 5 and 7. The rolls 3, 5 and 7 may be made of any suitable material. Where the pulling capacity of the winch mechanism is low, the rolls may be made of plastics material, but for higher pulling capacities the rolls may be made of aluminium or steel. To increase the frictional properties of the peripheries of the rolls, the rolls may be provided therearound with a material having relatively high frictional properties, such as a polyurethane material. The side plates 1 in the illustrated embodiment are generally rectangular, although any convenient shape may be employed, and the side plates may be made of any suitable material, such as aluminium pressure die castings.

The rolls 3, 5 and 7 are mounted in a rotatable manner in the side plates 1. The axes of the rolls 3 and 5 are stationary, while roll 7 is mounted in such a way that it is moveable towards and away from a line joining the axes of rolls 3 and 5. In the illustrated embodiment, the roll

7 is mounted in slots 9 formed in the side plates 1, the slots extending in a direction substantially perpendicular to the line joining the axes of rolls 3 and 5 and being positioned substantially mid-way between the axes of rolls 3 and 5. However, it should be noted that the same effect can be achieved by a loose-fit of the roll 7 in the side plates 1. The slots 9 are positioned to one side of the line joining the axes of rolls 3 and 5 such that the axis of roll 7 is positioned to one side of the line joining the axes of rolls 3 and 5. However, the precise disposition of the slots 9 relative to the line joining the axes of rolls 3 and 5 may be varied to some extent without affecting the operation of the winch mechanism in any significant detrimental manner. Moreover, the slots 9 may be replaced by any suitable configuration, such as elongate recesses, which permit movement of the roll 7 towards and away from the line joining the axes of rolls 3 and 5.

Extending around the rolls 3, 5 and 7 is a webbing material 11. The webbing material may be, for example, of polyester or other man-made material. The webbing material enters the winch mechanism and contacts part of the periphery of roll 3 on that side of the line joining the axes of rolls 3 and 5 remote from roll 7. The webbing material 11 then passes between the rolls 3 and 7 and around that part of the periphery of the roll 7 remote from the line joining the axes of rolls 3 and 5. Thereafter, the webbing material passes between the rolls 7 and 5 and around that

part of the periphery of roll 5 on that side of the line joining the axes of the rolls 3 and 5 before passing out of the winch mechanism.

The rolls 3, 5 and 7 are dimensioned, in conjunction with the thickness of the webbing material 11, such that the minimum distance between the peripheries of the rolls 3 and 5 is less than the diameter of the roll 7 with the webbing material extending therearound. Thus the roll 7 with the webbing material extending therearound is unable to pass between the rolls 3 and 5. It may be desirable, for safety reasons, for the minimum distance between the peripheries of the rolls 3 and 5 to be less than the diameter of the roll 7. Although the rolls 3, 5 and 7 are shown as all having substantially the same diameter, this is not essential and the rolls 3, 5 and 7 may each have any suitable diameter. Ideally the width of the rolls 3, 5 and 7 is substantially the same as the width of the webbing material 11.

It should be noted, however, that the webbing material may be replaced by a conventional cable or rope material.

The lower end of the webbing material 11 as illustrated in the figure is connected to a load (not shown), but it should be noted that the winch mechanism need not be oriented as shown in the figure. The upper roll 5 as illustrated in the figure is connected to drive means (not

shown). The drive means may comprise mechanically, electrically or other powered drive means or may comprise a handle or the like for manual operation.

To assist operation of the winch mechanism, the driven roll 5 and the moveable roll 7 may be interconnected by gears (not shown) secured to both the driven roll 5 and the moveable roll 7. The gears may be, for example, deep tooth spur gears which remain engaged irrespective of the position of the moveable roll 7 relative to the slots 9. The gears may be made of any suitable material depending on the pulling capacity of the winch mechanism. When the capacity of the winch mechanism is low, plastics gears may be used, but as the pulling capacity rises the gears may be made of aluminium or steel.

The upper end of the webbing material 11 may pass to a suitable form of storage (not shown) for the webbing material. The storage may take the form of a drum. It will be appreciated, however, that because the drum is not operating as a winch mechanism the issue of mechanical advantage does not arise.

The winch mechanism also incorporates a braking mechanism (not shown) which may be of any convenient known form. The braking mechanism allows the winch mechanism to be self-sustaining. The use of an automatic self-sustaining brake

mechanism ensures safe operation when lifting and accurate control when lowering.

In operation of the winch mechanism, a length of webbing material 11 is passed around the rolls 3, 7 and 5 as previously described. That end of the webbing material 11 extending from the roll 3 is connected to a load (not shown) while the other end of the webbing material may pass, for example, to a storage drum (not shown). The effect of the load, in combination with the braking mechanism (not shown) is to prevent uncontrolled unwinding of the winch mechanism and to urge the roll 7 in a direction towards the line joining the axes of the rolls 3 and 5. Therefore the greater the load the greater the force with which the roll 7 is urged against the webbing, cable, rope or the like positioned between the roll 7 and the rolls 3 and 5 and, consequently, the greater the frictional forces between the rolls 3, 5 and 7 and the webbing material 11.

Clockwise rotation of the upper roll 5 illustrated in the figure, in combination with the gears (not shown) where provided, exerts a pulling or lifting force on the webbing material and consequently on the load. Because the webbing material passes through the winch mechanism, and is not accumulated on a drum or the like which is used to transfer the pulling or lifting force to the load, the winch mechanism according to the present invention permits a

constant force to be exerted on the load rather than the force which varies as winding progresses. Further, the height of lift or the distance through which a load can be moved is limited only by the length of webbing material that is available and not by the dimensions of the winch mechanism.

The winch mechanism according to the present invention provides a lightweight lifting or pulling device for example for tightening overhead electric cables, telegraph wires, fencing or the like. The mechanism is sufficiently light for such applications to be operated with one hand by a person working on a pylon or up a pole. Alternatively, the winch mechanism may be used in DIY applications, such as changing a car engine or moving a boat or caravan.

The load capacity of the winch mechanism may be, for example, in the range from 0.25 tonne to 5 tonnes or more.

CLAIMS

1. A winch mechanism comprising first, second and third rolls for receiving therearound a webbing, cable, rope or the like, the first and second rolls being rotatable about the axes thereof and the third roll being rotatable about the axis thereof and being moveable towards and away from a line joining the axes of the first and second rolls at a point along the line intermediate the first and second rolls,

the arrangement of the webbing, cable, rope or the like being such that it:

(a) extends around that part of the periphery of the first roll on that side thereof remote from the third roll;

(b) passes between the first roll and the third roll;

(c) extends around that part of the periphery of the third roll remote from the line joining the axes of the first and second rolls;

(d) passes between the second roll and the third roll; and

(e) extends around that part of the periphery of the second roll on that side thereof remote from the third roll,

the first, second and third rolls and the webbing, cable, rope or the like being dimensioned such that the distance between the first and second rolls is less than the diameter of the third roll with the webbing, cable, rope or the like extending therearound.

2. A winch mechanism as claimed in claim 1, wherein the first, second and third rolls are mounted between a pair of side plates.

3. A winch mechanism as claimed in claim 2, wherein the third roll is slidably mounted in the side plates.

4. A winch mechanism as claimed in claim 3, wherein the third roll is slidably mounted in the side plates by means of slots or recesses formed therein.

5. A winch mechanism as claimed in any preceding claim, wherein the third roll is moveable in a direction substantially perpendicular to the line joining the axes of the first and second rolls.

6. A winch mechanism as claimed in claim 5, wherein the third roll is moveable along a line which intersects the

line joining the axes of the first and second rolls at a point substantially midway between the axes of the first and second rolls.

7. A winch mechanism as claimed in any preceding claim, wherein the webbing, cable, rope or the like comprises a webbing material.

8. A winch mechanism as claimed in any preceding claim, wherein one or more of the first, second and third rolls is provided with a relatively high friction material around the periphery thereof.

9. A winch mechanism as claimed in any preceding claim, wherein the first, second and third rolls are dimensioned such that the distance between the first and second rolls is less than the diameter of the third roll.

10. A winch mechanism as claimed in any preceding claim, wherein one of the first and second rolls is provided with drive means.

11. A winch mechanism as claimed in claim 10, wherein the drive means is powered.

12. A winch mechanism as claimed in claim 11, wherein the drive means is powered mechanically, hydraulically or electrically.

13. A winch mechanism as claimed in claim 10, wherein the drive means is operable manually.

14. A winch mechanism as claimed in any one of claims 10 to 13, wherein the driven roll and the third roll are interconnected by means of gears such that rotation of the driven roll causes corresponding counter-rotation of the third roll.

15. A winch mechanism as claimed in any preceding claim, wherein the webbing, cable, rope or the like wound in by the winch mechanism is stored in storage means.

16. A winch mechanism as claimed in claim 15, wherein the storage means comprises a rotatable drum.

17. A winch mechanism as claimed in any preceding claim and including a braking mechanism to allow controlled unwinding of the webbing, cable, rope or the like.

18. A winch mechanism substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9417533.8
Relevant Technical Fields (i) UK Cl (Ed.N) B8B (BCDL, BCDH, BCFA) (ii) Int Cl (Ed.6) B66D	Search Examiner M J DAVEY Date of completion of Search 19 SEPTEMBER 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) WPI	Documents considered relevant following a search in respect of Claims :- 1 TO 18

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	**P:**	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	**E:**	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	**&:**	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
Y	GB 2171973 A	(FITZGERALD-SMITH) see Figure 2 in particular	1, 2
X	GB 1445032	(KAUFER) see Figure 7 and page 4, line 118 to page 5, line 24 in particular	1 to 6 and 9 to 13
X	GB 874912	(T C & M C LTD) see in particular sheaves 12, 14, 20 in Figure 2	1
Y	EP 0110250 A2	(HANEL) see Figure 2 in particular	1
X	US 4557465	(LUNDBERG) see in particular wheels 9, 35, 19 in Figure 5	1

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).